COMPUTERS & EDUCATION

An International Journal

Editors:
Rachelle S. Heller The George Washington University
Jean D. M. Underwood Leicester University

Volume Contents and Author Index

VOLUME 29

1997

PERGAMON

COMPUTERS & EDUCATION

EDITORS

Professor RACHELLE S. HELLER
Department of Electrical Engineering
and Computer Science
The George Washington University
Washington, DC 20052, U.S.A.
Fax: +1 202 994 0227
e-mail: sheller@seas.gwu.edu

Dr JEAN D. M. UNDERWOOD
Leicester University
School of Education
21 University Road
Leicester LE1 7RF, U.K.
e-mail: JDU@leicester.ac.uk

EDITORIAL ADVISORY BOARD

A. A. Pouring, U.S.A. (Founder Editor)
D. F. Rogers, U.S.A. (Founder Editor)
P. R. Smith†, U.K. (Founder Editor)

A. Bartlomé, Spain
J. Chew, Singapore
D. Clements, U.S.A.
B. Collis, The Netherlands
T. Downes, Australia
J. Gal-Ezer, Israel
M. Gigante, Australia
J. R. Hartley, U.K.
B. Kurshan, U.S.A.
T. Kurtz, U.S.A.
E. Lehtinen, Finland
T. Plomp, The Netherlands
W. Ramsay, U.K.
T. Sakamoto, Japan
I. Sanders, South Africa
P. Scrimshaw, U.K.
D. Squires, U.K.
W. Tagg, U.K.
D. J. Thompson, U.S.A.

European Book Review Editor: Professor David Hawkridge, Institute of Educational Technology, The Open University, Milton Keynes MK7 6AA, U.K.

U.S. Book Review Editor: Professor Joyce Little, Department of Computer and Information Sciences, Towson State University, Baltimore, MD 21204, U.S.A.

Author Service Department: For queries relating to the general submission of articles (including electronic text and artwork) and the status of accepted manuscripts, please contact the Author Service Department: e-mail: authors@elsevier.co.uk; Fax: +44 (0) 1865 843905; Tel.: +44 (0) 1865 843900.

Publishing Office: Elsevier Science Ltd, Bampfylde Street, Exeter EX1 2AH, U.K. [*Tel.*: *Exeter (01392) 251558; Fax*: *(01392) 425370*]

Advertising Office: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. *[Tel.*: *Oxford (01865) 843000; Fax*: *(01865) 843010]*

Subscription Rates

Annual Institutional Subscription Rates 1998: Europe, The CIS and Japan NLG 1644.00; all other countries US$945.00. Associated Personal Subscription rates are available on request for those whose institutions are library subscribers. Dutch Guilder prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice. Any enquiries relating to subscriptions should be sent to: **The Americas:** Elsevier Science Customer Support Department, P.O. Box 945, New York, NY 10010, U.S.A. [*Tel.*: (+1) 212-633-3730/1-888 4ES-INFO; *Fax:* (+1) 212-633-3680; *e-mail:* usinfo-f@elsevier.co.com]. **Japan:** Elsevier Science Customer Support Department, 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106, Japan [*Tel.*: (+81) 3-5561-5033. *Fax:* (+81) 3-5561-5047; *e-mail:* info@elsevier.co.jp]. **Asia Pacific (*excluding Japan*):** Elsevier Science (Singapore) Pte Ltd, No. 1 Temasek Avenue, 17-01 Millenia Tower, Singapore 039192 [*Tel.*: (+65) 434-3727; *Fax:* (+65) 337-2230; *e-mail:* asiainfo@elsevier.com.sg]. **Rest of the World:** Elsevier Science Customer Service Department, P.O. Box 211, 1001 AE Amsterdam, The Netherlands [*Tel.*: (+31) 20-485-3757; *Fax:* (+31) 20-485-3432; *e-mail:* nlinfo-f@elsevier.nl].

Back Issues

Back issues of all previously published volumes are available direct from Elsevier Science Offices (Oxford and New York). Complete volumes and single issues can be purchased for 1992–1996. Earlier issues are available in high quality photo-duplicated copies as complete volumes only.

Published 8 issues/annum (2 volumes) in January, February, April, May, August, September, November, December

Copyright © 1997 Elsevier Science Ltd

PERIODICALS POSTAGE PAID AT RAHWAY, NJ. *Computers & Education* (ISSN 0360-1315) is published 8 issues per year in January, February, April, May, August, September, November and December, by Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. The annual subscription in the U.S.A. is $945. *Computers & Education* is distributed by Mercury Airfreight International Ltd, 2323 Randolph Avenue, Avenel, NJ 07001-2413, U.S.A. POSTMASTER: Please send address corrections to *Computers & Education*, c/o Elsevier Science Regional Sales Office, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, U.S.A.

CONTENTS

Number 1

Biffah Hanciles, Venky Shankararaman and Jose Munoz	1	Multiple representation for understanding data structures
Renee M. Wachter and Jatinder N. D. Gupta	13	Distance education and the use of computers as instructional tools for systems development projects: a case study of the construction of expert systems
H. Zand and W. D. Crowe	25	Novices entering mathematics 2: the graphic calculator and distance learners
Laurie D. Edwards, Andrea Coddington and Deb Caterina	33	Girls teach themselves, and boys too: peer teaching in a computer-based design and construction activity
	49	Book Reviews

Number 2/3

MULTIMEDIA IN EDUCATION

Beverly Park Woolf	53	Introduction
Kathleen M. Swigger, Robert Brazile, Victor Lopez and Alan Livingston	55	The virtual collaborative university
Joseph A. Konstan, Paul Sturm, John McLeod and Leonard Lichtblau	63	Internet Self-Assessment in Pharmacology: a model for Internet medical education
B. C. Bruce, B. O. Carragher, B. M. Damon, M. J. Dawson, J. A. Eurell, C. D. Gregory, P. C. Lauterbur, M. M. Marjanovic, B. Mason-Fossum, H. D. Morris, C. S. Potter and U. Thakkar	73	*Chick*Scope: an interactive MRI classroom curriculum innovation for K-12
Sungkya Lee and Rachelle S. Heller	89	Use of a keystroke log file to evaluate an interactive computer system in a museum setting

Amnon Shabo, Mark Guzdial and John Stasko — 103 An apprenticeship-based multimedia courseware for computer graphics studies provided on the World Wide Web

Yasmin B. Kafai, Cynthia Carter Ching and Sue Marshall — 117 Children as designers of educational multimedia software

Martha E. Crosby and Marie K. Iding — 127 The influence of a multimedia physics tutor and user differences on the development of scientific knowledge

Number 4

Anne L. Russell and LeoNora M. Cohen — 137 The reflective colleague in e-mail cyberspace: a means for improving university instruction

Dennis J. Perks, Donna R. Gavitt and John J. Olivo — 147 Do you have an Internet Acceptable Use Policy?

Roger Austin — 153 Computer conferencing; discourse, education and conflict mediation

Alessandro Micarelli and Patrick Boylan — 163 Conversation rebuilding: from the foreign language classroom to implementation in an Intelligent Tutoring System

Michael Kress, Anatoliy Gordonov, Albert Blank and Marsha Moroh — 181 ComWeb: an electronic classroom for teaching computer literacy

Patricia Martínez — 189 KIDLINK: a place for children in the internet

Gareth Thorburn and Glen Rowe — 195 PASS: an automated system for program assessment

207 Book Reviews